Transportation Synthesis Report

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Certification Programs for Survey Technicians

Prepared for
Bureau of Project Development
Division of Transportation System Development

Prepared by
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WisDOT RD&T Program
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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WisDOT technical staff in highway development, construction and operations. Online and print sources include NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs, and related academic and industry research. Internet hyperlinks in TSRs are active at the time of publication, but changes on the host server can make them obsolete.

Request for Report

WisDOT has been using contractors for construction surveying tasks, specifically project staking, for many years. These contractors and subcontractors include survey technicians who work under the direction of a licensed professional surveyor.

With recent state workforce reductions, both contractors and WisDOT staff have expressed concerns about the lack of experienced department staff available to provide support to project managers in the field, and the lack of qualified survey subcontractors to perform the work. To ensure consistent, quality work, the Bureau of Project Development is considering creating a project survey technician certification program for contractors, with an emphasis on project staking. The RD&T Program was asked to research other states' experiences with training and testing survey technicians.

Summary

States vary in their certification requirements for survey technicians hired by contractors. Some state specifications leave the determination of technicians' qualifications to the contractor's discretion. Other states require or recommend certification with one of three national programs, which provide exams but do not offer training. Survey technicians may prepare for certification exams with courses at a technical or four-year college, or through a private company.

Arkansas Highway and Transportation Department is developing its own training and certification program for contractors who perform surveying tasks. A pilot course is expected to begin in spring of 2006 at the University of Arkansas at Fayetteville.

Some states also offer short (one- to four-day) courses in construction surveying or staking through their in-house employee training programs. One such course, geared to construction inspectors, is being modified by FHWA's Transportation Curriculum Coordination Council for national distribution.

National Certification Programs

American Congress on Surveying and Mapping/National Society of Professional Surveyors
Certified Survey Technician program
http://www.acsm.net/cst/index.html
A four-level certification program for surveying and mapping technicians. ACSM offers exams only, not training. Exams are 4 to 7 hours long. $50 application fee and $150 exam fee for non-members. Once a technician is certified, there is a $30 annual fee to keep the certification active.

- Arizona DOT requires ACSM/NSPS certification for its survey technicians; see the Arizona DOT entry below.

National Institute for Certification in Engineering Technologies
Highway Surveys program
http://www.nicet.org/certification/highwaysurveys.cfm
A certification program for engineering technicians involved in field and/or office aspects of highway surveying, developed in partnership with AASHTO and FHWA. Like ACSM, NICET offers exams only, not training, and has four levels of certification. Three-year certification for $195 exam fee; $40 annual registry fee for first two years of certification; $120 recertification fee. Continuing professional development courses are required for recertification.

- Curtis Clabaugh, state photogrammetry and surveys engineer at Wyoming DOT and chair of the TRB committee on surveying, said Wyoming used the NICET program for a while, but found the continuing fees to be problematic.

National Council of Examiners for Engineering and Surveying
http://www.ncees.org/
NCEES offers a Fundamentals of Surveying exam, which qualifies a technician as a Surveying Intern (formerly called Land Surveyor in Training). After 4 years of work experience, technicians can take the Principles and Practice of Surveying Exam. The Fundamentals of Surveying exam is 8 hours long and covers a range of subjects in surveying, including mathematical concepts, boundary law, field data acquisition, and plane survey calculation. Both exams are required for professional licensing.

- Curtis Clabaugh of Wyoming DOT said he has encouraged survey technicians to work toward an associate's degree, possibly through online courses, and take the Fundamentals of Surveying exam. He felt comfortable with the level of qualification conferred through the FS exam.

Other National Efforts

Transportation Curriculum Coordination Council
TCCC is a pooled-fund project (WisDOT is a member) that is developing a national training curriculum for several transportation disciplines. TCCC has modified a Virginia DOT course in construction surveying for inspectors (see also "Virginia DOT" below) for national distribution. Laura Lawndy of TCCC sent us the course materials, which we will forward to you.

Contacts: Christopher Newman, Systems Preservation Engineer, FHWA Office of Asset Management, Christopher.Newman@fhwa.dot.gov, (202) 366-2023
Laura Lawndy, TCCC Program administration, FHWA Office of Asset Management, laura.lawndy@fhwa.dot.gov, (202) 366-3975

TRB Committee
Committee AFB80 (A2A01): Photogrammetry, Remote Sensing, Surveying and Related Automated Systems
Committee details: http://gulliver.trb.org/directory/comm_detail.asp?id=1313

Staff contact: Thomas Palmerlee, tpalmerlee@nas.edu, (202) 334-2907
Committee chair: Curtis Clabaugh, Wyoming DOT, curtis.clabaugh@dot.state.wy.us, (307) 777-4086

State DOTs' Approaches

Arkansas Highway and Transportation Department
Development of Roadway Construction Control Certification Program
http://rip.trb.org/browse/dproject.asp?n=8408
AHTD currently uses contractors to perform surveying-related activities prior to and during the construction process, including grade/slope staking, horizontal and vertical curve layout, curb and gutter staking, and culvert staking. This project will develop and implement a training and certification program for roadway construction control.

We spoke with Dorothy Rhodes of AHTD's research division, who said the final report is near completion. She said the training program would most likely begin as a pilot course at the University of Arkansas at Fayetteville in the spring of 2006. Rhodes will forward the final report when she receives it.

Contacts: Dorothy Rhodes, AHTD Planning and Research Division, Dorothy.Rhodes@arkansashighways.com, (501) 569-2072
Rodney Williams, project investigator, University of Arkansas at Fayetteville, rdw@engr.uark.edu, (501) 575-7535

Arizona DOT
http://www.dot.state.az.us/
Arizona DOT requires that their in-house survey technicians be certified through the ACSM/NSPS program, and requires either NICET or ACSM/NSPS certification for contractors on construction projects. Contractor surveys must be directed by a PE or a registered land surveyor, and crew chiefs must have achieved either NICET or NSPS Level III certification. A minimum of 50% of the remaining crew personnel must have achieved NICET or NSPS Level II certification.

We spoke with Paul Jokilehto, chief surveyor at ADOT, who said that in determining which certification to require, he personally took all the ACSM/NSPS exams, and would recommend that anyone interested in evaluating the programs do the same. He feels that they offer good coverage of topics that are relevant to the duties of survey technicians on highway projects.

To help ADOT employees prepare for the exams, ADOT offers 12 training courses, three for each of the four levels of the NSPS program. Each class is one to two days long and very intensive; Jokilehto says the 12 classes cover the equivalent of two semesters of college courses. The classes are tailored to transportation crew duties, and are primarily classroom instruction, which the employees then apply in their jobs in the field. Jokilehto sent us a CD of the workbooks used in the classes, which are now taught by a consultant.

Jokilehto said ADOT has been requiring certification for survey technician contractors since the late 1980s, and that the department didn't experience any resistance when the regulation was implemented.

Certifications required for ADOT survey technicians
http://www.azdot.gov/Highways/ConstGrp/PDF/DistrictSurveySkills.pdf

In-house construction training (includes surveying courses)
http://www.azdot.gov/Highways/ConstGrp/Training.asp

Contact: Paul Jokilehto, chief surveyor, PJokilehto@azdot.gov, (602) 712-5740

Wyoming DOT
http://www.dot.state.wy.us/
Wyoming DOT has explored both the NICET and ACSM certification programs, and used the NICET program for a while but found the continuing fees to be a hindrance to participation, since NICET certification is not tied to salary increases. Curtis Clabaugh said Wyoming's specifications don't require any specific level of training for survey technicians—the accountability for their work is placed with the licensed surveyor or professional engineer supervising them. He notes that Wyoming statutes permit professional engineers to do five out of seven surveying-related tasks (the exceptions being land boundary surveys and land subdivisions, which are reserved for licensed surveyors). Wyoming DOT interprets that to mean that PEs cannot determine right-of-way boundaries, but can set the alignment within the right-of-way, including slope staking and curb and gutter staking.

Clabaugh said he has encouraged survey technicians to work toward an associate's degree through online courses (often through the University of Wyoming), and take the Fundamentals of Surveying exam. He feels comfortable with the level of qualification conferred through the FS exam.

Contact: Curtis Clabaugh, state photogrammetry and surveys engineer (and TRB committee chair), curtis.clabaugh@dot.state.wy.us, (307) 777-4086

North Carolina DOT
http://www.doh.dot.state.nc.us/preconstruct/highway/location/staff/
North Carolina DOT has in the past conducted in-house surveying training and has developed a self-study course, both of which included exams upon completion. NCDOT is discussing pursuing a certification program for both in-house and contractor survey technicians.

Professional Development Hours Courses
Past professional development courses offered by the NCDOT Location & Surveys Unit include instruction on specific Trimble equipment.
http://www.doh.dot.state.nc.us/preconstruct/highway/location/staff/pdhcredits.htm

Contact: C. Shannon Sweitzer, State Roadway Construction Engineer, csweitzer@dot.state.nc.us, (919) 733-2210

Virginia DOT
http://www.vdot.virginia.gov/
VDOT offers a two-day Construction Surveying course geared to construction inspector trainees. VDOT's Bill Beuter says it is a basic course but can also be used for higher-level staff, or for new or inexperienced contractor staff. It includes a hands-on field activity, and Beuter says it is a very popular class.

VDOT's course is being formatted for national distribution through the TCCC; see above.

Contact: Bill Beuter, Bill.Beuter@VDOT.Virginia.gov, (804) 371-4875

Illinois DOT
Tech Transfer Training
http://www.dot.il.gov/blr/special2004.pdf
IDOT offers three- to four-day courses in surveying and construction staking (see pages 12 and 13) geared to local agency staff. Courses include exams, and certificates are issued to students with a score of 70% or higher. Courses provide professional development hours credits. Contractors are not required to take the courses.

We contacted Michael Renner, Construction Operations Engineer, who said most of IDOT's construction staking is performed by consultants or surveyors employed by the contractor (most Illinois construction contracts make construction staking a contractor responsibility). He said there are no stated requirements for those individuals, but that they are usually the same people who would work for IDOT.

He noted that surveyors typically work for IDOT in one of three capacities: Route Survey, Land Survey or as a function of Construction Inspection. All require prequalification, and Route and Land require an Illinois Licensed Professional Land Surveyor. Construction Inspection requires an experienced survey party chief, typically a PLS.

Contact: Michael Renner, Construction Operations Engineer, RennerMF@dot.il.gov, (217) 782-6667
Contact for Tech Transfer program: Kevin Burke, Tech Transfer Program Coordinator, BURKEK@dot.il.gov, (217) 785-5048

Colorado DOT
Construction Inspector Certification Program
http://www.dot.state.co.us/CHRMEmpCorner/documents/Employee%20Development%20Documents/COURSE%20CATALOG%20COORDINATION%201%20updated%20June%2027%202005.doc
CDOT offers courses on surveying geared toward inspectors, rather than survey technicians (see pages 3 and 4).

North Dakota DOT
http://www.ltapt2.org/PAR/ND.htm
North Dakota DOT offers a three-day tech transfer course called "Basic Surveying for Local Road Departments," which uses outdoor group exercises to reinforce classroom training (highlighted briefly at this page on the national LTAP Web site).

Examples of qualifications required for technicians:
Kansas DOT
Contractor Construction Staking Specifications
http://165.201.199.23/burconsmain/specprov/pdf/90p-0260-r04.pdf
See page 3 of PDF. Excerpt (*emphasis added*):
"2) Surveying Personnel. Before performing any surveying operations on the project, inform the Engineer of the personnel that are responsible for land surveying and construction surveying and staking. Provide a Land Surveyor

that is licensed by the Kansas State Board of Technical Professions according to Kansas Statutes to perform the required land surveys, and the setting of all section corners, right-of-way survey monuments, and reference point monuments set on the right-of way lines. **Provide an engineer or surveyor that is trained and experienced in the construction staking** necessary for the project to perform the required construction surveys and staking."

Nebraska DOT
Construction Surveying Specifications
http://www.nebraskatransportation.org/ref-man/specbooke/100/100-e14.pdf
See page 2. Excerpt (*emphasis added*):
"c. Construction Requirements:
(1) (i) The **construction staking shall be done by personnel who are trained and experienced** in construction layout and staking of the type and kind required in the contract.
(ii) If the Contractor subcontracts the "Construction Staking and Surveying," the work shall be done **under the direction of a registered Professional Engineer or registered Land Surveyor**.
(iii) All right-of-way monuments and lines shall be established by a registered Land Surveyor employed by the Contractor.
(iv) It is recommended that the **crew chief be NICET Certified Level III** or a registered Land Surveyor.
(v) It is recommended that **50 percent of the survey crew be NICET Certified Level II**."

Iowa DOT
General Supplemental Specifications for Highway and Bridge Construction
http://www.dot.state.ia.us/specifications/new_docs/GS-01005_Web.pdf
See page 64. Excerpt (*emphasis added*):
"Survey work shall be done **with a Professional Engineer** licensed in the State of Iowa **or a Professional Land Surveyor** licensed in the State of Iowa in responsible charge, in accordance with provisions of Chapter 542 B, Code of Iowa. The Contractor shall **submit to the Engineer a resume identifying the field survey personnel** and their capabilities to perform the intended requirements."

State Practices in Contractor Surveying

FHWA Study: "Strategies for Coping with Construction Project Staffing Demands"
http://www.fhwa.dot.gov/programadmin/contracts/cope_sum.htm

- Survey was done in 1998.
- 30 states responded to the survey; 15 were using contractor construction staking at that time: AK, AR, AZ, FL, LA, KS, MN, MS, NE, NC, ND, NV, TX, VA, WA